

ENGR M01: INTRODUCTION TO ENGINEERING

Originator

srelle

College

Moorpark College

Discipline (CB01A)

ENGR - Engineering

Course Number (CB01B)

M01

Course Title (CB02)

Introduction to Engineering

Banner/Short Title

Introduction to Engineering

Credit Type

Credit

Start Term

Spring 2020

Catalog Course Description

Explores the branches of engineering, the engineering profession, the interface of the engineer with society, and engineering ethics. Explains the engineering education process and explores effective strategies for students to reach their full academic potential. Introduces the methods of engineering analysis, engineering design and problem solving. Develops written, computer and oral communication skills in analyzing and presenting data in engineering design and problem solving.

Taxonomy of Programs (TOP) Code (CB03)

0924.00 - *Engineering Technology, General (requires Trigonometry)

Course Credit Status (CB04)

D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)

A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)

N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)

D - Possibly Occupational

Course Cooperative Work Experience Education Status (CB10)

N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)

Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)

N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)

Y - Not Applicable

Course Noncredit Category (CB22)

Y - Credit Course

Funding Agency Category (CB23)

Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)

1 - Program Applicable

General Education Status (CB25)

Y - Not Applicable

Support Course Status (CB26)

N - Course is not a support course

Field trips

May be required

Faculty notes on field trips; include possible destinations or other pertinent information

Destinations could include visits to engineering firms in the Ventura County area such as HAAS engineering, Aerovironment engineering, Skyworks engineering, etc., to the Navy Base in Point Mugu or Port Hueneme, and to JPL.

Grading method

Letter Graded

Alternate grading methods

Student Option- Letter/Pass
Pass/No Pass Grading

Does this course require an instructional materials fee?

No

Repeatable for Credit

No

Is this course part of a family?

No

Units and Hours

Carnegie Unit Override

No

In-Class

Lecture

Minimum Contact/In-Class Lecture Hours

17.5

Maximum Contact/In-Class Lecture Hours

17.5

Activity

Laboratory

Minimum Contact/In-Class Laboratory Hours

52.5

Maximum Contact/In-Class Laboratory Hours

52.5

Total in-Class

Total in-Class

Total Minimum Contact/In-Class Hours

70

Total Maximum Contact/In-Class Hours

70

Outside-of-Class**Internship/Cooperative Work Experience**

Paid

Unpaid

Total Outside-of-Class**Total Outside-of-Class****Minimum Outside-of-Class Hours**

35

Maximum Outside-of-Class Hours

35

Total Student Learning**Total Student Learning****Total Minimum Student Learning Hours**

105

Total Maximum Student Learning Hours

105

Minimum Units (CB07)

2

Maximum Units (CB06)

2

Student Learning Outcomes (CSLOs)

Upon satisfactory completion of the course, students will be able to:	
1	describe the role of engineers in society and classify the different engineering branches, the functions of an engineer, and industries in which they work.
2	identify and describe academic pathways to the bachelor's degree.
3	develop and apply effective strategies to succeed academically.
4	explain engineering ethical principles and standards.
5	demonstrate knowledge of effective practices for writing technical engineering documents and making oral presentations.
6	analyze engineering problems using the engineering design process.
7	demonstrate teamwork skills in working on an engineering design team.

Course Objectives

Upon satisfactory completion of the course, students will be able to:	
1	classify the different engineering branches, describe the role of engineers in society, the functions of engineers, and the industries in which they work.
2	identify and describe academic pathways to four-year degrees.
3	develop and apply effective strategies to reach full academic potential.
4	explain the role of professional engineers and apply the principles of engineering ethics and standards.
5	demonstrate knowledge of effective practices for research, gathering of data, writing technical engineering reports, and making oral presentations.
6	analyze engineering problems and synthesize solutions using the engineering design process.
7	demonstrate basic computational, data manipulation, and manual engineering drawing skills.
8	demonstrate the teamwork skills necessary for successful completion of engineering design projects.

- 9 demonstrate knowledge of certain basic fundamental laws of physics, engineering concepts, and mathematics in problem solving.

Course Content

Lecture/Course Content

- **20% - Research and hands-on activities including experimentation, data collection, data analysis, estimation, and presentation of results**
- **15% - Exposure to modern engineering tools and practices**
- **10% - Written and oral communication skills related to engineering**
- **20% - Engineering design, creativity, and problem solving processes**
- **5% - Engineering education**
 - Academic success
 - Curriculum
 - Pathways
 - Preparation for upper division coursework
 - Presentations from university professors
- **10% - Engineering profession**
 - Branches
 - Functions
 - Industries
 - Careers
 - Job outlook
 - Industry guest speakers
- **10% - Professionalism and ethics in engineering**
- **10% - Role of engineers in society and comparison of engineering, science, and technology**

Laboratory or Activity Content

In order to gain exposure to modern engineering tools and practices, learn how to problem solve, and gain experience working in teams, students will:

- **40% - Conduct hands-on experiments, make measurements, gather data, analyze data, and reverse engineer parts and devices**
- **30% - Use computers for computational, graphing, and engineering drawing purposes**
- **30% - Complete design projects according to engineering design process**

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises
Skills demonstrations
Written expression

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Classroom Discussion
Computational homework
Group projects
Laboratory activities
Laboratory reports
Objective exams
Oral presentations
Projects
Problem-solving exams
Participation
Quizzes
Reports/papers
Skills demonstrations

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Computer-aided presentations
Collaborative group work

Class activities
 Class discussions
 Case studies
 Demonstrations
 Field trips
 Group discussions
 Guest speakers
 Instructor-guided interpretation and analysis
 Instructor-guided use of technology
 Internet research
 Laboratory activities
 Lecture
 Small group activities

Describe specific examples of the methods the instructor will use:

Instructor will use PowerPoint presentation, short YouTube videos, group activity, and classroom demonstration to explain course content. In addition, the instructor will model problem solving and how to interpret and analyze data presented in graphs and charts.

Representative Course Assignments

Writing Assignments

- Write a technical report for an assigned engineering design project. An example would be: Write a technical report documenting the design and the construction process of a weightlifting machine.
- Write short essays regarding engineering disciplines, engineering ethics and principles, engineering education, the role of engineers in society, etc. A sample topic would be: According to the Code of Ethics of the National Society of Professional Engineers (NSPE): "...engineers are expected to exhibit the highest standard of honesty and integrity." Write a brief opinion explaining how you would handle the following ethical dilemma: You inadvertently saw several of the problems on an upcoming exam when you visited your professor in her/his office.
- Answer questions from lectures, such as: What are the steps of the engineering design process? Describe Newton's laws of motion.

Critical Thinking Assignments

- Apply knowledge gained in the classroom to analyze and synthesize data gathered from hands-on activities and experimentation. An example would be: Using the results of 15 trial projectile launches with a constant compressional spring force, calculate the mean and the standard deviation of the landing distances. Also, using your standard deviation result, estimate the next landing distance of the projectile with the same constant compressional spring force, and then fire the projectile and see how close your estimation is to the actual landing distance. Calculate a percent error.
- Apply knowledge gained in the classroom to analyze and synthesize engineering problems. An example would be: A 0.5-m wooden shelf weighing 50-N needs to be attached to a wall to support a weight of 100-N. Design an optimal attaching mechanism for the shelf to the wall using either a hinge and a cable assembly or a hinge and a single wooden bar supporting the shelf from beneath. Explain why your design is the optimal design.

Reading Assignments

- Read handouts provided by the instructor regarding current events in engineering design and technology, summarize the article, and answer questions about the article.
- Read and study selected chapters from the textbook and the accompanying lecture notes, then answer questions or solve problems assigned by the instructor. An example would be: Read the chapter on Units, Unit Conversions, and Unit Analysis, then using the lecture notes provided by the instructor solve for the proper units of J in this equation: $\emptyset = (T \cdot L) / (J \cdot G)$. Be sure to use SI System of Units (International System of Units).

Skills Demonstrations

- Demonstrate the proper use of various measuring tools, including but not limited to: Ruler, Vernier Caliper, Micrometer, Triple Beam Mechanical Balance, Vernier Scale for Mass, Digital Multimeter, etc.
- Demonstrate the use of Excel spreadsheets for computational and graphing purposes.

Outside Assignments

Representative Outside Assignments

- Interview an engineer, preferably in the discipline of your interest, asking them about their educational pathway, what motivated them to become an engineer, what they most like and value about their profession, what they least like about their job, how do they think they contribute to the society, etc.
- Design, analyze, and construct a weightlifting machine operating on the principle of pressure differences.

Articulation**C-ID Descriptor Number**

ENGR 110

Status

Approved

Equivalent Courses at 4 year institutions

University	Course ID	Course Title	Units
San Francisco State	ENGR 100	Intro to Engineering	1
Cal Poly San Luis Obispo	CE 112	Design Principles in Civil Engineering	2
CSU Long Beach	ENGR 101	Introduction to Engineering Profession	1
Cal Poly Pomona	CE 122	Introduction to Civil Engineering	1
UCI	ENGR 7A	Introduction to Engineering I	2
UCLA	ENGR 87	Introduction to the Engineering Disciplines	4
CSU Northridge	ECE/MSE 101 & 101L	Introduction to Electrical Engineering and Lab	1, 1
Cal Poly San Luis Obispo	ENGR 110	Introduction to Engineering	2
CSU Bakersfield	ECE 1618	Introduction to Engineering	2

District General Education**A. Natural Sciences****B. Social and Behavioral Sciences****C. Humanities****D. Language and Rationality****E. Health and Physical Education/Kinesiology****F. Ethnic Studies/Gender Studies**

Course is CSU transferable

Yes

CSU Baccalaureate List effective term:

Fall 2012

CSU GE-Breadth**Area A: English Language Communication and Critical Thinking****Area B: Scientific Inquiry and Quantitative Reasoning****Area C: Arts and Humanities****Area D: Social Sciences****Area E: Lifelong Learning and Self-Development****CSU Graduation Requirement in U.S. History, Constitution and American Ideals:****UC TCA**

UC TCA

Approved

IGETC**Area 1: English Communication****Area 2A: Mathematical Concepts & Quantitative Reasoning****Area 3: Arts and Humanities****Area 4: Social and Behavioral Sciences****Area 5: Physical and Biological Sciences****Area 6: Languages Other than English (LOTE)****Textbooks and Lab Manuals****Resource Type**

Textbook

DescriptionLandis, R. B. (2013). *Studying engineering. A road map to a rewarding career*, (4th ed.). Discovery Press.**Resource Type**

Textbook

DescriptionMoaveni, S. (2019). *Engineering fundamentals: An introduction to engineering*, (6th ed.). Cengage Learning.**Resource Type**

Textbook

DescriptionBrockman, J. B. (2009). *Introduction to engineering: Modeling and problem solving*. Wiley.**Resource Type**

Textbook

Classic Textbook

No

DescriptionOakes, W. C., and Leone, L.L. (2016). *Engineering your future: A comprehensive introduction to engineering*, (9th ed.). Oxford UP.**Resource Type**

Textbook

Classic Textbook

No

DescriptionStephan, E. A., Bowman, D. R., Park, W. J., Sill, B. L., and Ohland, M. W. (2017). *Thinking like an engineer: An active learning approach*, (4th ed.). Pearson.**Library Resources****Assignments requiring library resources**

Simple machine design and reverse engineering projects

Sufficient Library Resources exist

Yes

Example of Assignments Requiring Library Resources

Research, using the Library's print and online resources, to gather information on the different types of catapults (trebuchet, mangonel, onager, and ballista), their operational differences, and historical uses. Then using the materials provided by the instructor, construct a catapult that can hurl a rubber bouncy ball 6 meters into a 3ft x 2ft x 1ft container.

Primary Minimum Qualification

ENGINEERING

Review and Approval Dates

Department Chair

09/24/2019

Dean

09/26/2019

Technical Review

10/03/2019

Curriculum Committee

10/15/2019

DTRW-I

MM/DD/YYYY

Curriculum Committee

MM/DD/YYYY

Board

MM/DD/YYYY

CCCCO

MM/DD/YYYY

Control Number

CCC000533483

DOE/accreditation approval date

MM/DD/YYYY